



ISSD

NEWSLETTER

Volume III Number 1

April 1990

Notes from the Editors

This edition starts the beginning of Volume III and the introduction of the new editors, Charles L. Powell, II and Terry Chatterton. We have some new ideas we will be incorporating into the newsletter, but will strive to keep up the outstanding quality of the **ISSD Newsletter**.

As in the last issue I would like to stress that the **ISSD Newsletter** will not appear every other month. We will not put out an inadequate newsletter and there just aren't enough articles to keep up a schedule of six issues per year (as a matter of fact there is currently no backlog of articles).

As ideas for new papers we would like to make the following suggestions. In looking over the general statement for **ISSD** we have found two of the statements (inside cover) that should be addressed. The first, "To encourage uniformity in record keeping systems for captive

propagation programs..." Since the pinnacle of raising dart-poison frogs is to breeding them we would like to see one or several papers suggesting a record keeping system for breeding **Dendrobatids** frogs. With this uniformity of record keeping the information that is learned from breeding **Dendrobatids** can more easily be passed from person to person and will hopefully lead to better (or at least easier) interpretations of the data. The second statement we would like to address is "to encourage the establishment and maintenance of stable and genetically diverse captive populations of endangered or threatened species" (for that matter for all **Dendrobatid** species). In looking over all the previous issues of **ISSD Newsletter** I know that several **Dendrobatid** species are in captivity in the United States and a greater number are in captivity

in Europe. What we would like to see someone do is put together a database of who has what and who is breeding what. In this way anyone who is looking for breeding information for a particular species or looking for a breeding loan will have a better idea of where to look. Also we will have a better idea of what species are currently not being bred in captivity and therefore where our preservation activities should start.

Many people may feel that they are too inexperienced to write, or that their writing skills are not up to public display. Well that's why there are editors. We will be glad to help anyone with an article, so please take the effort to write or this newsletter may become a yearly issue.

-Classified Ad.-

Wanted: *Dend. reticulatus*.
Contact Chuck Powell, 2138
Harrison St., Santa Clara, CA
95050. Tel. (408) 244-9807.

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The Dendroculturist- Mutation

**(a tongue-in-cheek look
at reproductive
strategies)**

Dale Bertram

One area of zoological research in which there is currently a great deal of interest is that of reproductive strategies. Interest in the various reproductive strategies employed by living organisms crosses many traditional disciplinary boundaries. Discussions of these strategies and their evolutionary significance can be found in the writings of taxonomists, evolutionary biologists, behavior sociobiologists, and many others.

It is a basic premise of life that the first priority of any organism is to reproduce itself.

How this feat is accomplished often has a profoundly significant impact on the lifestyle of the organism. Some organisms do nothing at all in their fleetingly short adult life but attempt to mate. Of course, many other biological processes occupy the energies of most adult organisms, but none of these have any significance unless the ultimate goal of survival (reproduction) is realized. All forms of life must have some mechanism for reproduction. These mechanisms range from the profoundly simple to the intricately complex. Most single cell organisms reproduce themselves simply by splitting into two organisms; where there was once one, now there are two and where there are two, there will be four and so on.

Most multicellular organisms have developed specialized sex cells (gametes) whose function is to unite with similar cells from another individual and develop into

a new individual. Some organisms simply discharge huge numbers of gametes into the environment where only a very few actually combine and survive to produce new mature individuals. The production of fertile, genetically complete larva is only the first step in the long and difficult process of reproduction.

The reproductive strategies of amphibians were long believed to be rather simple. Like most biological phenomena, the closer we look the more complex things seem to be. The majority of amphibians employ the "shotgun" approach to reproduction - large numbers of larva are produce. With few exceptions this is accomplished by the discharge of gametes into the environment, albeit in close proximity to one another (external fertilization). For the majority of amphibians reproductive responsibility ends there. The fertile eggs are left to fend for themselves, uncared for,

as it were. Obviously the survival rate of larval forms produced by this method is low, but it only takes one. With respect to population dynamics, an adult need only produce one successful offspring in the course of its life to maintain a stable population of that species. An enormously important factor in the success or failure of this method is the relative hostility of the environment towards the vulnerable larva. The more hostile the environment the higher the mortality of the offspring, especially if those offspring are left to fend for themselves. Many amphibians utilize an aqueous medium for their egg deposition. Eggs are deposited in a pond or stream where they are safe from desiccation. The larva produced in this manner are reasonably well equipped to fend for themselves in this relatively stable environment. Even with the security of the water, larval mortality is quite high and

survival is ensured only by the relatively massive numbers of offspring produced.

Some amphibians live in environments where there is no standing water. They have consequently developed other methods to ensure survival of their offspring; usually this means some kind of parental care. Most amphibians make at least some attempt at brood care. Even the simple task of anchoring the egg string or mass to submerged twigs or rocks may be thought of as a form of limited parental care. When the term "brood care" is employed in its usual sense, it implies a somewhat higher level of involvement on the part of the parental animals. Many frogs display complex methods of brood care. In some this consists of complete development of the larva within the urogenital tract of the mother frog with the subsequent "birth" of fully developed froglets. Other frogs carry their larva about with them during their

development. This takes several forms among which is the depositing of the larva within a special brood pouch, as in the marsupial frogs. There are frogs which carry their young about in their mouths while the larva develop. There are some frogs which carry their larva imbedded in small caverns within the skin of the parent's back, the young frogs emerge fully developed.

The so-called Dart-Poison frogs of the family Dendrobatidae display a very complex and most interesting reproductive strategy. These small, toxic, and brilliantly colored frogs are indigenous to the jungles of Central and South America where they are terrestrial breeders. They have developed brood care strategies which allow for such significant improved chances of larva survival that they are able to reproduce themselves with amazingly small clutches.

The typical Dendrobatid

species lays a small clutch of 3 to 20 terrestrial eggs. These eggs are then cared for by one or the other of the parental frogs. The eggs are guarded and usually they are washed and otherwise tended until the tadpoles hatch. What really makes Dendrobatids unique is what they do for the larva after they hatch from the egg. The terrestrial egg deposition site will not support the development of tadpoles. To facilitate their further development the tadpoles are "transported" by the parent frog (in some cases the female and in others the male) to a suitable water environment. Typically the parent frog will settle himself/herself among the tadpoles until they wriggle themselves up onto its back. Then they are taken to an aquatic site, often the water cup of a plant such as a bromeliad, and discharged into the water. With some species parental care ends here but in others it is taken even one step further.

There is a group of

Dendrobatid frogs known as "egg feeders." These frogs will continue to care for their larva after they have been deposited in a water reservoir. The egg feeders feed their tadpoles with infertile eggs until they transform into froglets. In some species this egg feeding behavior has become so well developed that the larva will eat nothing else. Examples of egg-feeders include *Dendrobates histrionicus* and *D. pumilio*. Some species are facultative egg feeders; this means that even though parental eggs are the preferred food of the tadpoles, they will eat other things and can survive without the mother frog.

There are some animals which have developed systems where their young are cared for by animals of a different species. This is often seen with insects where the care of the young of a different species is part of some symbiotic relationship. Some birds also display this type of behavior, depositing their eggs in

the nest of a different species.

Recently it has been noticed that certain frogs, especially those of the family Dendrobatidae, also display a cross-species brood care behavior. It seems that the brilliant coloration and enduring behavior of Dendrobatid frogs stimulate some *Homo sapiens* to such an unusual extent that they will undertake brood care of the frogs. Most *H. sapiens*, when confronted with a Dendrobatid frog will find it mildly attractive. Some will even express a desire to possess and care for it. In the rare individual this tendency is so pronounced that it manifests itself in a virtual obsession, culminating in the typical brood care behavior. Individuals affected in this manner are termed "dendroculturist-mutants."

This brood care behavior is necessarily preceded by frog acquisition behavior, that is, a preoccupation with acquiring Dendrobatid frogs for the

purpose of obtaining eggs and tadpoles to care for. Badly affected individuals often neglect many other aspects of their daily endeavors while in pursuit of a new species of frog. The more colorful and beautiful the frog, the greater its ability to attract these reproductive "slaves." Some species are not well represented in the collections of the dendroculturists and thus are very difficult for the mutant to obtain. Some of these have evolved such colorful and beautiful markings that even their pictures in books have been enough to lure dendroculturists many thousands of miles from their home to collect them in their natural habitat.

Elaborate artificial environments are constructed where frogs are nurtured in an effort to induce them to produce eggs. Dendroculturist-mutants often spend countless hours reading about new and better methods of care for their

reproducing frogs. They have been known to form associations and societies to better communicate among themselves. Typically a dendroculturist-mutant will acquire a mating pair of Dendrobatid frogs and set about to provide them with the "perfect" environment. Success is defined solely on the basis of breeding. A dendroculturist who discovers a clutch of eggs for the first time often experiences profound feelings of joy and satisfaction. Alternatively, failure of breeding can result in extreme frustration. Any *H. sapiens* known to be keeping Dendrobatid frogs in his home who admits to these emotions should be strongly suspected of possessing the mutant gene. Once an egg clutch has been discovered the dendroculturist usually removes them from the parent frogs, preferring to care for them himself. The eggs are inspected frequently; they are periodically rinsed and any that

appear to be infertile or fail to develop are carefully removed from the clutch. Once the eggs hatch the tadpoles are transported to small water cups where they are fed, and the water refreshed, daily. Some mutants even construct complicated multi-chambered brooding tanks with water purification systems to care for their tadpoles. In this manner the tadpoles are raised until they metamorphose into froglets. Usually these froglets are sold or given to other dendroculturist-mutants in an effort to perpetuate the breed.

This may perhaps be the most highly adapted reproductive strategy known in the animal kingdom. In this manner many Dendrobatid frogs have developed amazing reproductive capacities. Some frogs, with the aid of the mutant culturist, have produced literally hundreds of offspring! A most impressively successful reproductive strategy.

Dendroculturists tendencies are most often seen in male *H. sapiens*, leading some to speculate that it may be a "Y" chromosome gene that has mutated to the "dendroculturist gene." A few rare female *H. sapiens* have demonstrated typical dendroculturist behavior, shedding some doubt on the "Y" chromosome theory. It seems that this mutation is concentrated in *H. sapiens* of northern European heritage, especially German and Dutch lineages. It has been noted that in many cases where the mutation has become manifest in North American specimens these are

often of northern European ancestry, however it is not limited to these blood lines. One badly affected specimen residing in Hawaii is of Japanese heritage.

Although the specifics of this phenomenon have yet to be clearly elucidated, it is clear that this example of interspecies cooperation represents a unique twist in reproductive strategy.

Recently one dendroculturist-mutant was noted to have commented on his condition, "it is a disease for which, lucky enough, there is no cure." A truly sick individual!

Dendrobatid on an Orchid Leaf - Jewel in its proper setting?

Ann Lauer Jesup

Everyone who undertakes something new brings a different perspective to it, based on his or her knowledge and experience. Each approaches a task from a unique viewpoint, including the task of keeping and breeding Dendrobatid frogs.

Our first Dendrobate,

Dendrobates pumilio, was sent to us some fifteen or so years ago by a scientist friend from Costa Rica. Of necessity, our husbandry (wifery?) was rather basic as the support system of ISSD did not yet exist and we were not aware of such luxuries as cricket ranches. Instead we raised a population of small psychodid fly, and kept the frog (successfully, I might add), in a small terrarium carpeted with moss. Our first foray into Dendrobatid culture ended on a sour note as the *D. pumilio* was stolen, container and all, at an Eastern Seaboard Herpetological League meeting.

Things have changed between then and now - for one thing the number and variety of animals in my collection has increased, drastically! But I am still working with a modified terrarium setup, the sole concession to the Mechanical Age being the timers for the Vitalites, for the soil heat tapes which run under the banks of terraria during

the cold season and the muffin fans during the warm season. For the rest, my terraria work on a balanced terrarium system, and they do not require cleaning more than twice a year. Occasionally some of the living moss needs replacement, but the tanks stay odor-free, disease-free, and the water remains clean and crystal clear.

My secret is — orchids (Actually, that's only part of the answer, but I thought that might get your attention). My husband and I are long-term orchidists, and while I can't put my frogs in the greenhouse. I can, and do, grow certain orchids better in my frog terraria than in the greenhouse!

Because most orchids are highly intolerant of stagnant air and are unhappy at lack of perfect drainage, and show this displeasure in a highly dramatic way by subsiding, piecemeal or entirely, into a pile of squishy rotten brown mush, I confined

my first attempts at growing orchids in my frog tanks to plants I knew grew in roughly similar conditions to those in my frog habitat - close to 100% humidity, warm, low light levels, and damp at the roots. To me this meant tropical rainforest terrestrial orchids, and one that I had enough of in the greenhouse to spare some to test. I tried *Ludisia discolor* (formerly *Haemaria discolor*), one of the so-called 'Jewel Orchids.' It was a rousing success. I tried other warm-growing terrestrial orchids with varying degrees of success - some species of *Erythroides* and *Goodyera* do well.

Since the littlest tanks, my 'quarantine' tanks for individual imported animals, are only 1-foot cubes, small plant size is a definite requirement. Also, since orchids have a short blooming season, those with attractive foliage serve a decorative purpose year round. Two things I neglected to factor in when deciding which species to

try were the height of the bloom spike above the foliage, and the difference in plant size between a normal specimen and a burgeoning, robust plant in the peak of health fed by frog feces! Apparently, Dendrobatid doo-doo makes excellent orchid fertilizer - at least for *L. discolor*. The result is that periodically I must remove and replant the topmost growth of the Jewel Orchid before it acquires a novel right-angle configuration due to a direct collision with the terrarium cover. Bloom spikes also have been known to exhibit this 'elbow syndrome' if in contact with a glass top, or if in a small tank with a hardware cloth lid, the spike continues straight up through the lid. This gives a nifty through-the-looking-glass effect.

Actually, when not tortured into unnatural angles, these plants are lovely things, and really glow in a tank. *Ludisia discolor* has velvety, deep bronze-green leaves shot through with veins of crystalline coral-orange. My

Dendrobates lehmanni makes quite a picture on these leaves as he calls from his favorite observatory or beds down at night, his colors echoed by the plant. The plant will start blooming when it is 8" or so high, and will carry bloom spikes of up to 25 dainty, white flowers. There are other varieties of *L. discolor* with different leaf patterning, but in the same color. All are equally at home in the terrarium setup.

Erythroides species most closely resemble our native goodyaras, the Rattlesnake Plantain Orchid, in the coloration and shape of the leaves, but the similarity stops there. DO NOT TRY ANY OF OUR NATIVE ORCHIDS in with Dendrobatid frogs. They cannot live in those conditions and we need to keep alive all our native orchids. Like our native herps, they are under tremendous pressure from habitat loss and overcollecting. If you find some in the path of 'development,' move them to a

similar location where they will be safe. But a rainforest terrarium is sure death for our native orchids - try a Jewel Orchid instead.

There are tropical members of the genus *Goodyera* which will grow happily in my terrarium - *G. daibuzanensis* is one of these. It comes from the rainforests of Taiwan and has a rosette of mottled leaves in shades of green and white, and white flowers on a spike 6" or so above the foliage.

I have succeeded with additional terrestrial orchids and intend to try a number of others, but I make a point not to try a plant in a terrarium until I can use a division which leaves the mother plant safe in the greenhouse. There are a number of orchids that I'm sure would do well if I had a big enough setup to house them, or more intense light, or better drainage (i.e. higher ground). Some day I expect to report on these.

The system of balancing my aqua-terrariums which works

best is very simple: a terrarium, the usual glass type, set on a sheet of aluminum flashing which is laid across a soil-heating cable spread out evenly and taped on aluminum foil. The cable is run by a timer and goes back and forth under a row of several tanks, warming them all simultaneously. I 'tune' the temperatures in the individual tanks by increasing or decreasing the total length of cable under each tank. If the entire bank of terraria served by one tape is too warm or cold I adjust the amount of tape under the tank where the thermostat is. Lessening the amount of tape and/or moving a strand of tape nearer the thermostat to a position farther away will cool the tank, reversing the procedure will warm them up. The timer which runs the heat tape is set to go off a half hour before the lights are due to go on, allowing a slight dip in temperature in the early morning.

The lights, four foot Vitalite Power Twists in banks of two, are

suspended four inches above the rows of tanks and are on 14 hours daily. In the summer, muffin fans run across these to dissipate heat buildup while the lights are on.

The tanks vary in size from 2.5 gallon to 25 gallon. The tops are screen and covered in varying degrees by sheets of Saran Wrap.

In the tanks is a substratum of tan, round-edged gravel about the size of a "BB" which comes from the New Jersey Pine Barrens. It is banked up to form natural-looking hummocks and hollows, with 1/4 to 1/2 of the area forming pool(s). Then rocks are set in and around the pool(s) to form a natural look. These pool(s) vary in depth depending on the size of the frog. Plants are then planted in the gravel, with the exception of the orchids, which are placed with their roots spread over its surface. Over the gravel and roots I then plant sheets and clumps of living mosses, taking care not to use fragile ones in tanks with large frogs as they

cannot stand the 'foot traffic' and are soon reduced to a black, gelatinous blob by way of protest at the stomping of heavy frog toes. I do not wash the mosses free of soil, as the soil clumps gathered with them serve to hold them intact and soon the plant roots have infiltrated both the moss hummocks and the gravel. Since the pool(s) are kept filled to a level at least 3/4" from the bottom of the tank, which means that the gravel is permeated to that level

also, the root systems penetrating the bottom level serve as a water filtration system for the entire tank. The orchid roots penetrate down that far also, but if they were planted at that level they would immediately rot; therefore, plant them on the surface of the gravel under the moss.

To my way of thinking, the most beautiful setting for a creature of the jungle, is the jungle. Somewhat glorified, to be sure, but (Continue on page 19)

Crossbreeding - To Be, or Not to Be? - Continued

In Volume II, number 4 (July 1989) and again in Volume II, number 6 (December, 1989) we published the opinions of several members regarding the question of the appropriateness, or lack thereof, of crossbreeding species of Dendrobatid frogs. We have encouraged the expression of these opinions so that the members might develop an awareness of this issue. Let me here reiterate that ISSD does not hold itself forth to be other than a sounding board for the opinions of its members. We do not attempt to suggest policy. What follows is another opinion on this issue. We welcome correspondence on this issue or any other which will be of general interest to members.

I am writing in response to the two items I read in volume II, number 6 of the ISSD Newsletter (my first newsletter as a member). First, in response to Gordon Snellings who wrote commenting on crossbreeding. It distresses me that anyone would throw away (discard) life simply because it was not of a "pure" line. Believe me if my frogs ever cross breed I would not flush them down the toilet. I do agree however that when animals are crossbred the resulting offspring are usually not as desirable as the original strain.

If crossbreeding is the desire of the keeper than certain factors should be considered. First, why do you want to cross these animals? Is it to verify a possible link between species? Is it to possibly promote a stronger species of frog (one that is more adaptive and can be kept easier than the pure breed of either species)? Or are you just doing it to see what happens? The first two reasons I consider reasonable.

I believe there is much that could be learned regarding the links between species by knowing if two species will mix and if the offspring are fertile. The third reason for cross breeding is a bit selfish to say the least. Arbitrary crossbreeding should be avoided unless you are willing and able to keep the offspring separated from the main colonies and maintained them throughout their lives. If these cross bred frogs are sold to anyone it is your responsibility to inform the purchaser exactly what you are selling. I do not intend to cross breed my frogs for the simple fact that there are too many species that I wish to work with, let alone to breed successfully. Also I believe that mixing of Dendrobate species in a captive environment is counter productive. If we are trying to give the most natural setting possibly to induce breeding how can putting two species together, which may never encounter each other in the wild, be anything but a negative

Book Review: Ralf Heselhaus: Pfeilgiftfrösche (Verlag Eugen Ulmer, 1988) 100 s.

Thomas Bille, Denmark

Books about Dendrobatids are unfortunately rare. Most everyone knows of the publications of Silverstone, but unfortunately these books don't cover the keeping or breeding of these beautiful frogs. Now with this new book by Ralf Heselhaus, who not only breeds a great number of Dendrobatids but has traveled to their habitats, this void has been filled.

This well illustrated book (65 photographs) covers about 50 species of Dendrobatids from the genera *Dendrobates*, *Phylllobates* and *Colostethus*. The book also contains stories about the authors trips to the homelands of these frogs.

Other chapters concentrate on conservation, Dendrobatids in the terrarium, breeding Dendrobatids, and breeding live food, among others topics. I especially like the chapter on the genus *Colostethus* which are still poorly represented in our terrariums.

I can highly recommend this book, it should be on everyone's book shelf who is even the least bit interested in keeping Dendrobatids. It is written in German and can be purchased for 38 DM from:

Buchhandlung ZIEGAN
Postdamer Str. 180/182
D-1000 Berlin 30
West Germany

Hybrid - Mongrel. Used originally of dogs, is now extended to other plants and animals, it is usually depreciatory, as denoting mixed, non-descript, or degenenerated breeds or characters.

American Family Reference Dictionary

Sad Enough

Luuc Bauer

Back in 1983 or early 1984 a catastrophe struck my collection of frogs and I think it was my own fault. Wim A. Tomey gave me three 'Ranitas rojas,' little redbacked froglets (*Dendrobates reticulatus*). The arrival of these little beauties was unexpected and I had no spare container to put them in. Weather was fairly cold and when I came home one of the frogs "sat" with legs stretched out - I supposed from stress and temperature. This one I kept in a plastic box with a handwarm wet sponge. But what to do with the others?

One terrarium housed some *Epipedobates tricolor* with a few little tree frogs from Surinam. This seemingly was roomy enough and so I put them in (no quarantine as they had been in another terrarium for some time). The following morning two of the *D. reticulatus* couldn't been found during a quick

look, but the ill one in the plastic box looked better so it was also put into the aquarium with the first two. Figuring that the moisture, moss and plants might make a better environment for its continued recovery.

After a days work I found one of the new *reticulatus* dead; the next morning the other two were also dead. A few days later one tree frogs, with legs stretched out, lay on its back and died; within a few days all inhabitant of this terrarium had died. After another week or 10 days the infection jumped from tank to tank; it was hardly more than a month before almost all animals in my terrarium corner (an L shaped room with mainly *Dendrobatids* and *Hylids*) had died.

From mistakes you may learn; so what does this bunder teach us? We all know that newly acquired animals should be kept

separate for a period of three months. Do not violate this rule! Also do not combine several species of frogs in one container. If a disease is to be kept under control the animals should be housed separately and their tank should be taken apart and thoroughly cleaned and disinfected. Be sure to always have a spare plastic terrarium set aside for those unexpected frog which may come your way. Size and beauty of this container is unimportant as the animals will only reside there for a short time.

I would like to encourage members of ISSD to study parasites and illness (and of course cures) in Dendrobatid frogs.

-New Literature-

This is a new section we wish to initiate. Its aim is to bring recent and significant literature references on Dendrobatid frogs to Society members. Anyone who is aware of any literature on Dendrobatid frogs is asked to send full citations to either editor. (Terry Chatterton, 8007 Ridge Rd., Arvada, CO 80002 or Charles Powell, 2138 Harrison Street, Santa Clara, CA 95050). Thanks.

Rivero, Juan A. and Serna, Marco A., 1985, Sobre la identificación de los *Colostethus* (Amphibia: Dendrobatidae) de Colombia. Caribbean Journal of Science, 21(3-4): 143-153.

Rivero, Juan A. and Serna, Marco A., 1988, La identificación de los *Colostethus* (Amphibia, Dendrobatidae) de Colombia. Caribbean Journal of Science, 24(3-4): 137-154.

Rivero, Juan A. and Díaz, Humberto G., 1989, Nuevos *Colostethus* (Amphibia, Dendrobatidae) del Departamento de Cauca, Colombia. . Caribbean Journal of Science, 25(3-4):148-152.

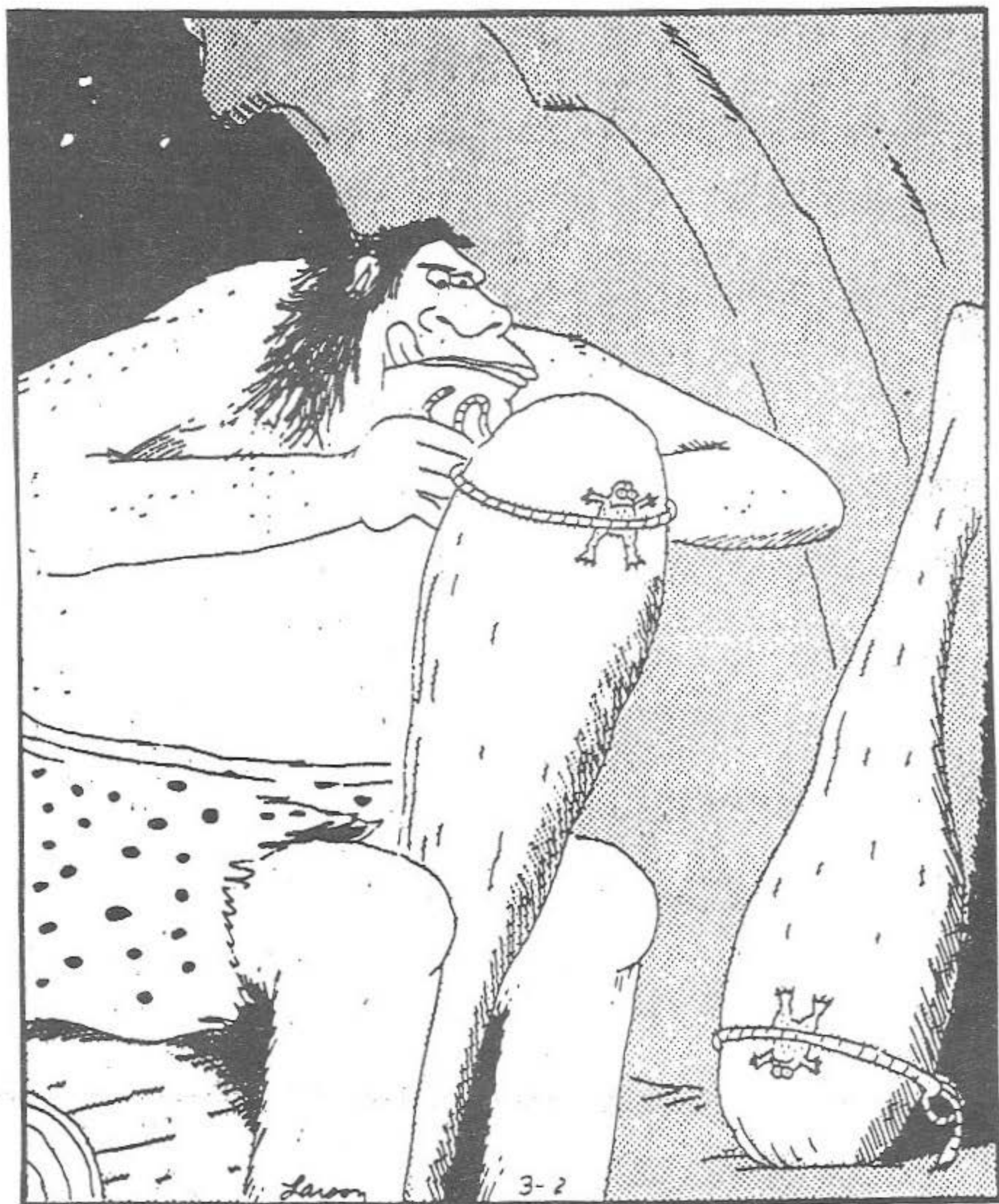
enoughto give the feeling both for the frogs and for the people. And when I see the *D. histrionicus* males go grumbling and complaining to bed down, each on his chosen leaf, or the *Epipedobates anthonyi* tadpoles

nibbling at the algae, below a leaf whose tip has arched over to dip into their pool, or watch the *D. auratus* kindergarten scrambling through the jungle-gym of *Ludisia discolor* plants, I think maybe, just maybe, we're getting the hang of it.



Dendrobates tinctorius (Schneider) Photographed by Dale Bertram. We are in need of photographs and/or slides of Dendrobatid frogs to be printed in the ISSD Newsletter. With submissions please include name of frog, who photographed the frog and any other pertinent information. Submit photographic negatives or slides to either Newsletter editor.

The Far Side



The night before the hunt, Neanderthals would carefully prepare their weaponry - often employing the help of the deadly club-poison frogs.



**ISSD invites anyone
with an interest in the
study of Dendrobatid
Frogs to participate in
its membership.**

Membership Registration:

Name: _____

Address: _____

Phone #: _____

Date: _____

Comments: _____

Annual membership dues are as follows: \$20.00 for members living in the U.S.A. and Canada; \$25.00 for members living in Europe and South America. For members holding a personal checking account with a U.S. bank - a personal check (made out in U.S. dollars and made payable to ISSD) will suffice. For those who do not have an account with a U.S. bank - payment should be made using one of the following methods (listed in order of preference): 1.) A U.S. Postal Money Order made out in U.S. dollars. 2.) A Cashier's Check from a U.S. bank, or U.S. affiliate of a non-U.S. bank, made out in U.S. dollars. 3.) A Cashier's Check from a non-U.S. bank, made out in the normal currency of the bank of issue, for an amount which will yield \$28.00 when it is exchanged. 4.) Cash -U.S.\$, wrapped well so that it cannot be seen through the envelope, and sent via Registered Mail.

Send registration forms and dues to:

ISSD - c/o Ed Tunstall
2320 West Palomino Drive
Chandler, Arizona
85224 U.S.A.